

103,516

PATENT

SPECIFICATION



*Application Date, Jan. 26, 1916. No. 1279/16.*

*Complete Accepted, Jan. 26, 1917.*

#### COMPLETE SPECIFICATION.

#### Improvements in the Construction of Submarines.

I, EDWARD CHARLES ROBERT MARKS, of 57 & 58, Lincoln's Inn Fields, London, W.C., Consulting Engineer, do hereby declare the nature of this invention (a communication from abroad by the Società Anonima Italiana Gio. Ansaldo & C., of No. 2, Via Garibaldi, in Genoa, Italy, Manufacturers), and 5 in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the construction of submarines of the type wherein the hull is divided into a number of cylindrical bodies arranged with their longitudinal axes horizontal.

10 It has been proposed in such a vessel to provide two cylindrical chambers disposed above a central longitudinal chamber, communication from the upper chambers to the lower chamber being effected by means of doors disposed between such chambers.

15 In general, when the hull is composed of a single rigid body as in the majority of cases, the transverse watertight bulkheads are of very doubtful efficiency owing to the need for opening communicating doors between the several holes or compartments of the hull. This drawback is to be found also in submarines built with a side passage extending along the compartments for the purpose of isolating them, since such a passage eliminates the necessity of providing communicating doors for the different compartments.

20 The present invention has now for its object to provide an improved construction of submarines designed for the purpose of eliminating the above stated drawbacks.

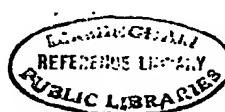
25 In the submarine according to the invention, one of the cylindrical bodies is arranged above the other or others and communicates therewith by means of cylindrical connecting passages in such a manner that it is possible to communicate with any of the compartments by means of the upper cylindrical body, thereby avoiding the necessity of providing watertight doors in the bulkheads of the lower cylindrical body or bodies.

30 The outer contour of the vessel is retained so as to present the least resistance to the progress of the vessel, and to preserve the sea-going qualities of the vessel.

The upper cylindrical body may be readily detached as a whole from the lower cylindrical body, or bodies, so that it can constitute practical means of saving the crew.

35 The greater part of the quarters for the crew is arranged in the upper cylindrical body, that is to say, in a body which is entirely out of the water during the travel of the submarine along the surface, so that as regards the

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facility of ventilation and lighting, the crew will be able to live under conditions very similar to those existing in ordinary torpedo boats.

The storage batteries are disposed, according to the invention in compartments which are completely isolated from the remainder of the hull.

A further feature, according to the invention consists in the arrangement of the double bottoms in such a manner that instead of their being distributed uniformly right and left of the plane of symmetry of the vessel, they are for the greater part concentrated in the actual planes of symmetry, whereby the installation of accessories for pumping out and filling the double bottoms is rendered more easy, and there is also less possibility of the vessel heeling over when the double bottoms are partly filled, as is the case during the manœuvres of the vessel in ascending and descending above and below the surface. 10

Two ways of carrying the invention into effect will now be more particularly described with reference to the accompanying drawings in which:—

Figs. 1, 2, 3, 4 and 5 are diagrammatic illustrations of another construction 15 of a submarine according to this invention, whilst

Figs. 6, 7, 8, 9 and 10 are diagrammatic illustrations of another construction.

In the form illustrated by Figs. 1 to 5, A, A are two side cylinders constituting the main central body of the vessel, and B is a cylinder superposed thereon. 20

Fore and aft of the cylinders A, that is to say, just where the latter terminates for constructional reasons, or are contained or continued within the limits of the outer hull, the rigid hull extends in the form of two cylinders CC. 25

The bodies A, B, C, instead of being cylindrical, may have the shape of truncated cones if such is found advisable. The compartments D and F comprised between the cylinders and the outer hull, may be utilised for water ballast or for holding liquid fuel. These compartments may be emptied by means of compressed air whatever the depth, or by means of pumps at the surface if the outer hull is light and therefore unable to withstand high external pressure. Two compartments E E of a suitable capacity are bounded by strong bulkheads in the central part of the body AA, and they may be so 30 shaped and constructed as to be capable of being used as strong double bottoms, so that they can be emptied even by means of pumps at great depths.

In the case of flooding of one of the compartments of the principal body A, use may be made of the compartments E, for the purpose of preventing all risk of the vessel heeling over. A modified construction is illustrated in Figs. 6, 7, 35 8, 9 and 10, which also comprises an upper cylindrical body A, and only one lower cylindrical body B.

The space between the body B and the outer hull is reserved for double bottoms, for water ballast, and for containing liquid fuel.

As indicated in Figs. 8, 9 and 10, if desired the cylinder B may be arranged 40 to contact the outer hull tangentially, or it may be distinctly separate therefrom, in which case double bottoms will be formed as indicated at C.

The lower bottom B is divided into several compartments by means of watertight bulkheads. The access to said compartments is possible only through the upper body A, by means of hatches or the hoods covering ladder ways. In 45 other respects this modification is similar to the first modification.

It is to be understood that many variations of detail will be covered by the invention without departing from the nature of the latter.

In the following claims the terms "cylindrical body" or "bodies" are to be understood as including bodies of truncated, conical or other suitable shape. 50

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A submarine, wherein the hull is divided into a number of cylindrical bodies which are arranged with their longitudinal axes horizontal, characterised 55 in this, that one of the cylindrical bodies is disposed above the other or others,

communication between the upper and lower bodies being effected by means of connecting passages whereby watertight doors in the bulkheads of the lower body or bodies are rendered unnecessary.

5 2. A submarine as claimed in Claim 1, wherein the outer hull retains approximately the most suitable shape for presenting a minimum resistance to the progress of the vessel.

3. A submarine as claimed in Claim 1, wherein the upper cylinder is adapted to be readily detached as a whole from the lower body or bodies, so that it can constitute a life-saving apparatus for the crew.

10 4. A submarine as claimed in Claim 1, wherein the quarters of the crew are arranged for the greater part in the upper cylinder, which latter remains above water during the surface navigation of the submarine.

5. A submarine as claimed in Claim 1, wherein the storage batteries are installed in compartments completely isolated from the rest of the vessel.

15 6. A submarine as claimed in Claim 1, wherein the double bottoms are almost all concentrated in the plane of symmetry of the vessel instead of being distributed as usual uniformly to right and left of the said plane of symmetry.

7. A submarine constructed and operating substantially as hereinbefore described, and as illustrated in, and by the accompanying drawings.

20 Dated this 25th day of January, 1916.

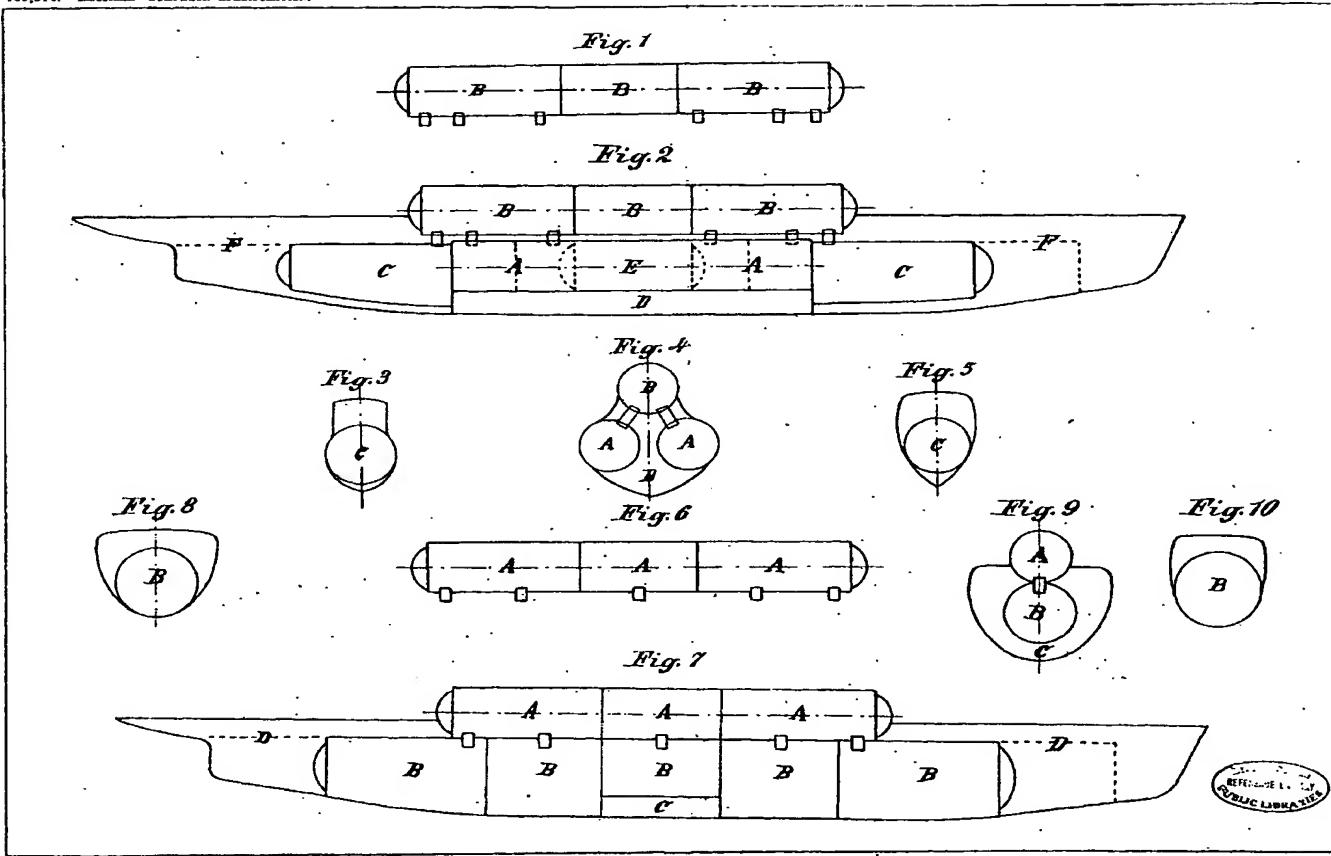
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103,516. MARKS' Complete Specification.

1 SHEET



[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1

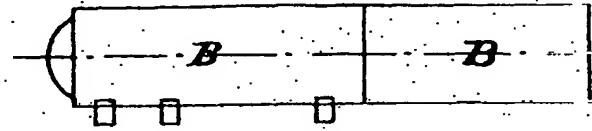


Fig. 2

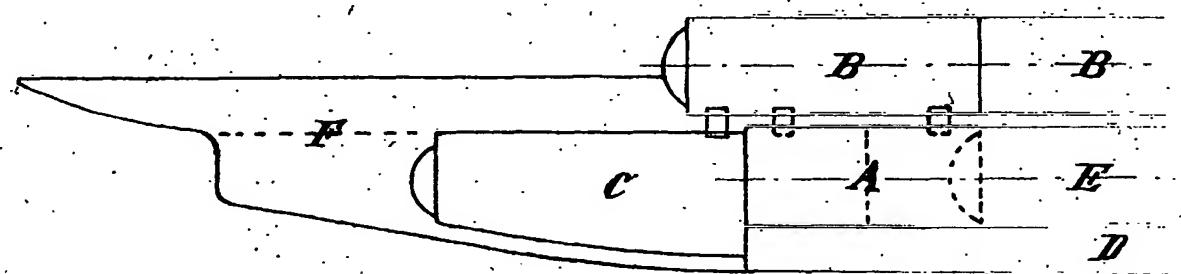


Fig. 4

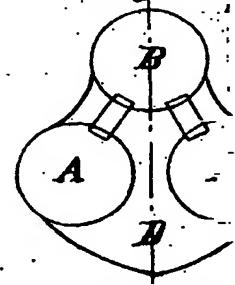


Fig. 3

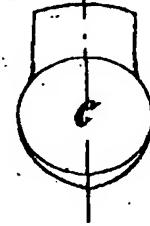


Fig. 6

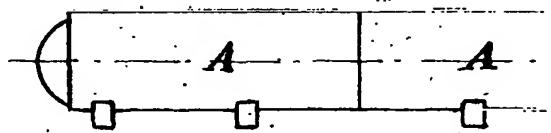
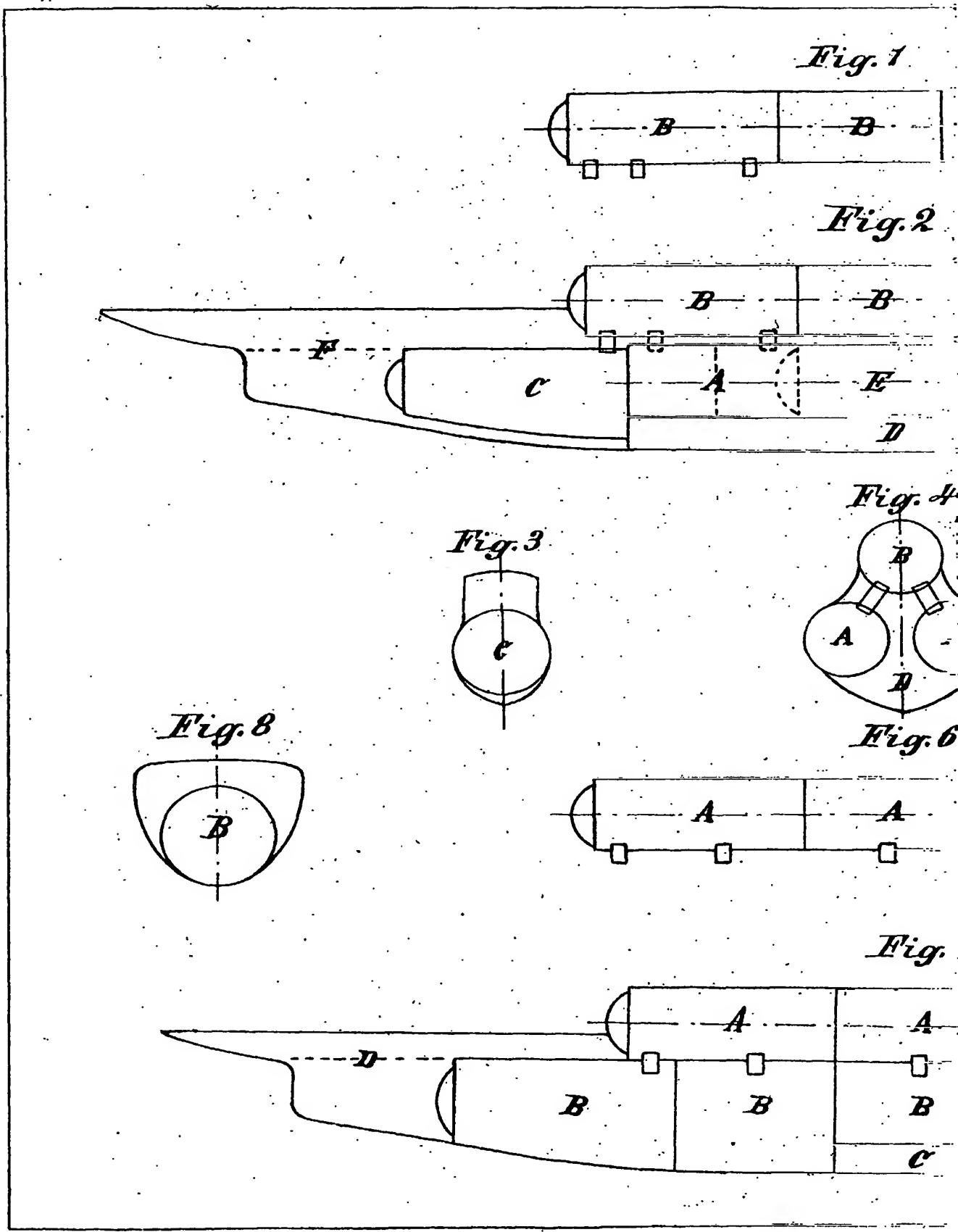
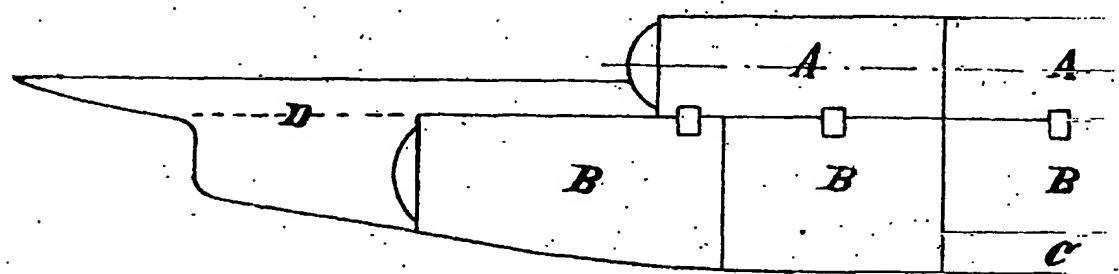


Fig.



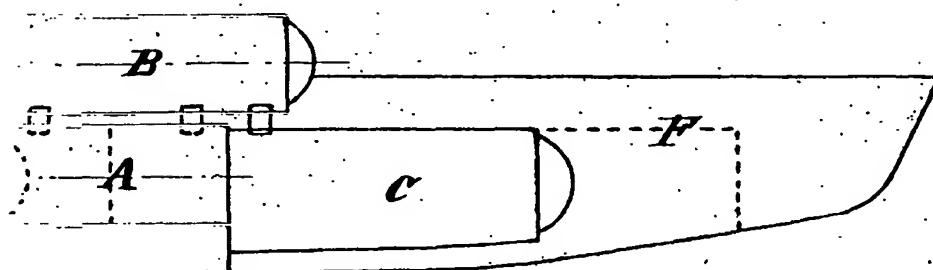
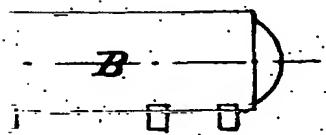


Fig. 5

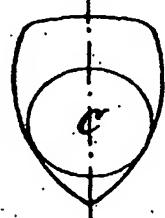


Fig. 9

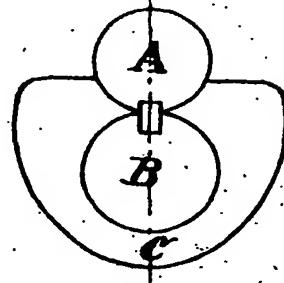
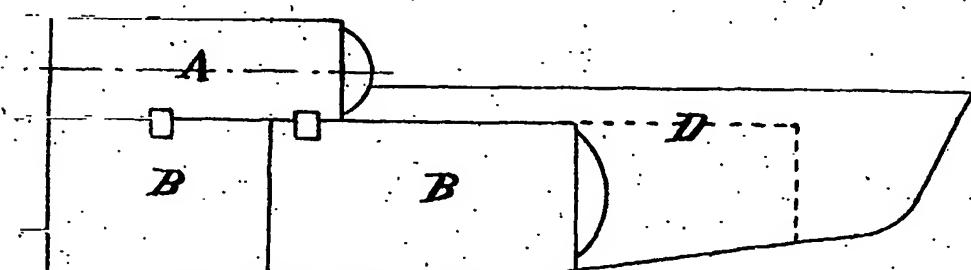
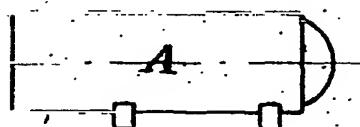
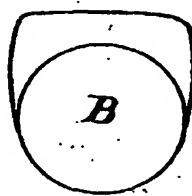


Fig. 10



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